

Abstract #1466

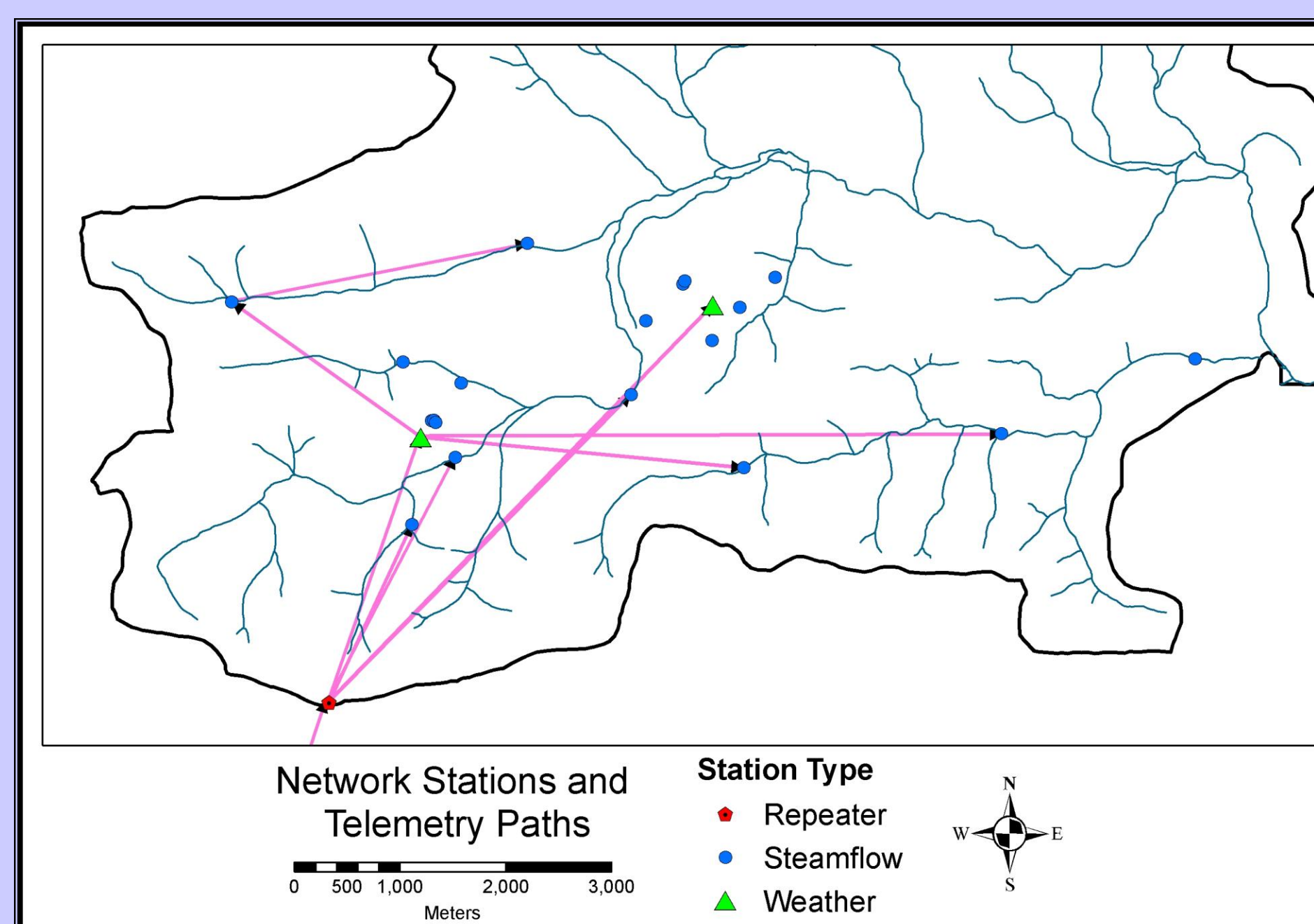
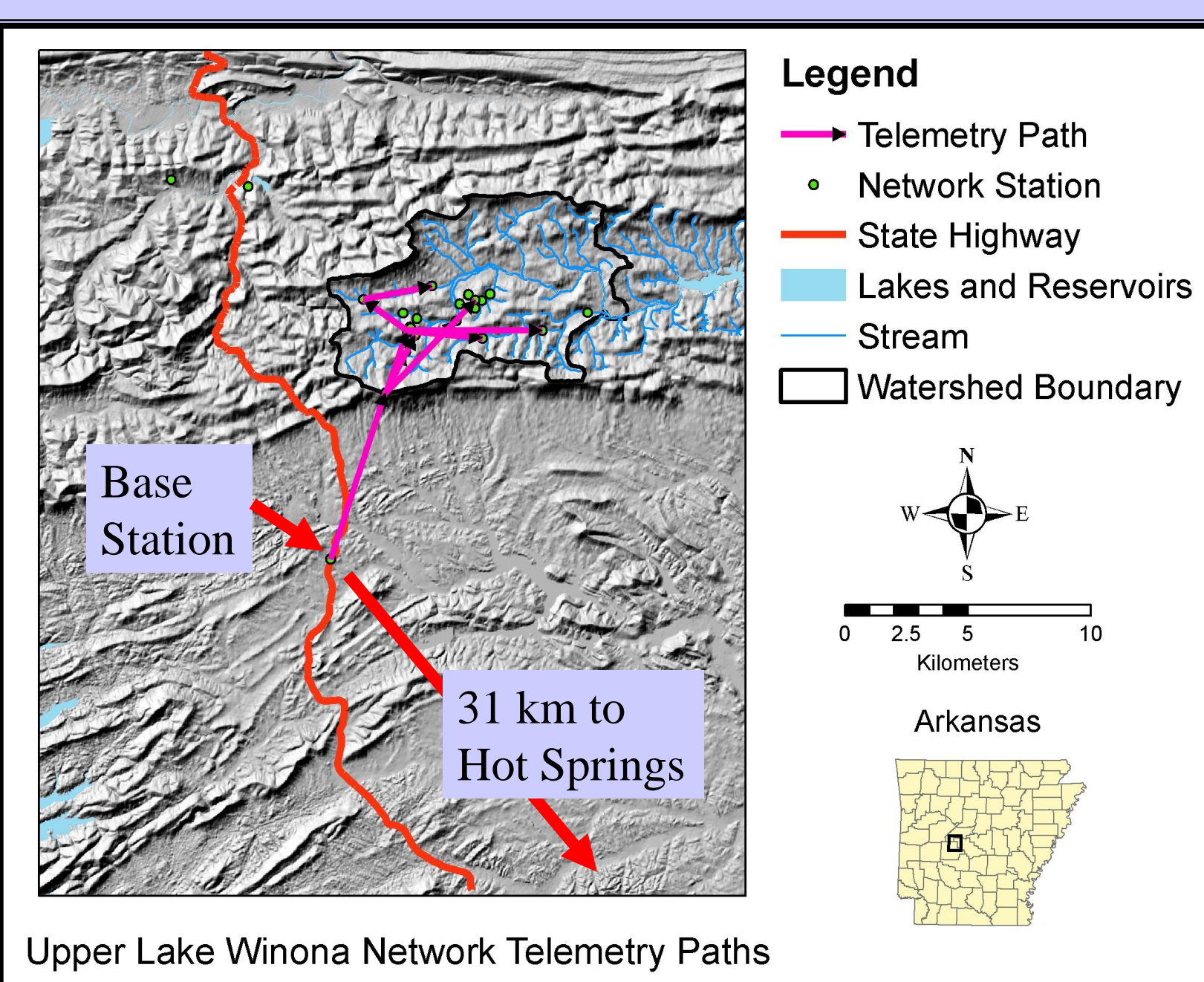
Daniel A. Marion

USDA Forest Service, Southern Research Station, P.O. Box 1270, Hot Springs, AR 71902,  
dmarion@fs.fed.us

Paper #H13A-0974

## 1.0 Objective

Highlight the advantages, disadvantages, and lessons learned using radiotelemetry (RT) for wildland hydrologic research.



## 2.0 Background

### Network Description

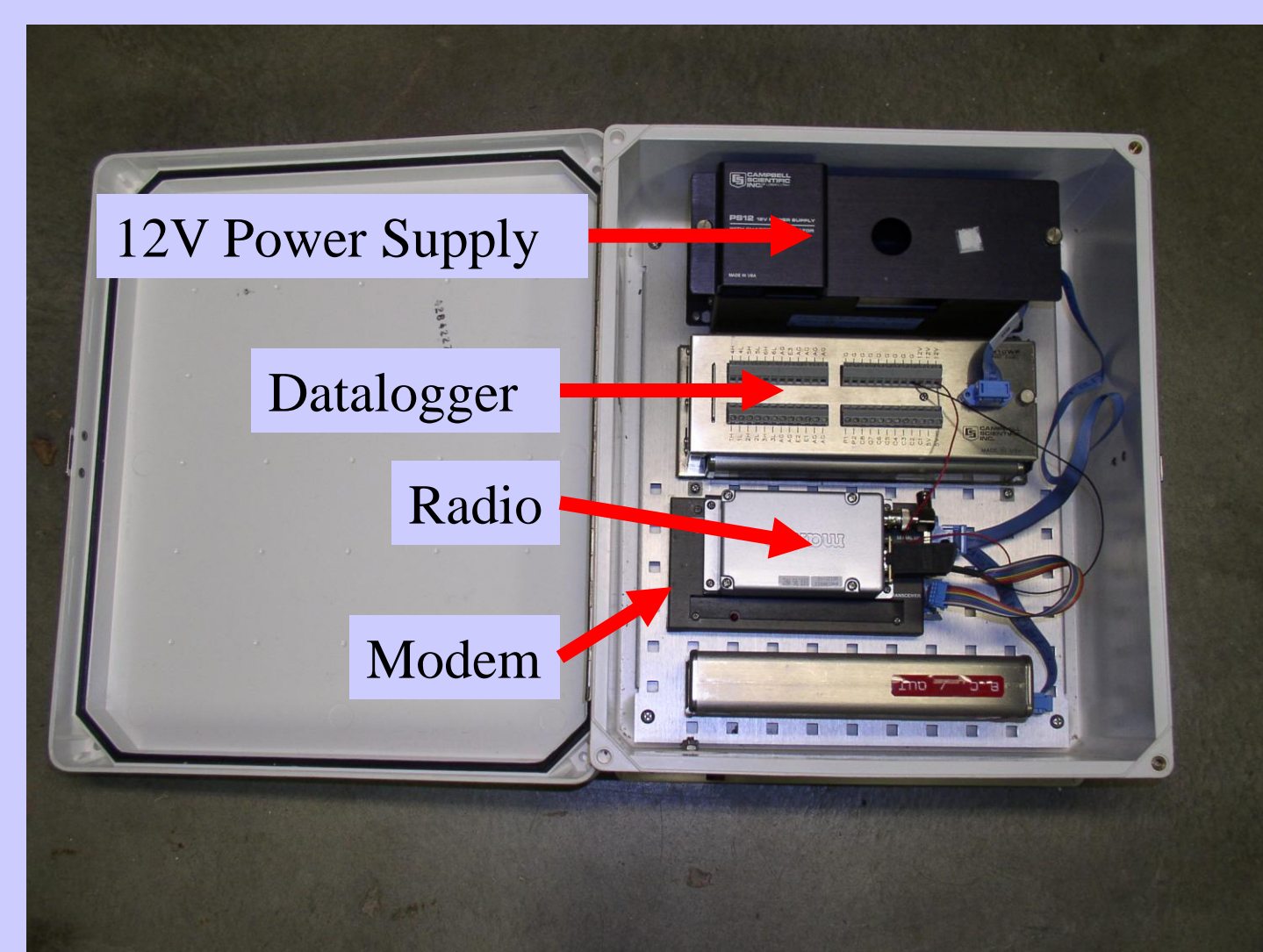
- Location – Ouachita Mountains, Arkansas
- Operation – 10+ years
- Station types – 10 streamflow, 2 weather, 1 repeater
- Sensors – water elevation, precipitation, water temp., pump sampler, wind speed, wind direction
- Environment – 125+ cm rainfall, 0-35 C, forest cover

### RT Definition

The use of radio transceivers to send data/commands between the user's computer and one or more field stations where data are being collected.

### RT Hardware

Base station, radios, modems, antennas, Ethernet interface



The use of trade, firm, or corporation names in this poster is for information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture of any product or service to the exclusion of others which may be suitable.

## 3.0 RT Advantages

### Reduced On-site Data Storage

RT usage reduces the need to store data at field stations.

### Reduced Field Time

Largely eliminates need for field visits to remove stored data.

### Easier Data Collection

- Data collection no longer constrained by weather.
- More frequent data collection reduces missing data.
- Automated, unattended data collection possible

### More Efficient Event Sampling

Monitored processes can be determined prior to field visits.

## 4.0 RT Challenges cont'd

### Additional Technical Expertise Required

- Electricity and electronics knowledge
- Construction skills
- Site maintenance skills (e.g., power tools, OHV operation, tower climbing, software programming).
- Use contractors



## 4.0 RT Challenges

### Additional Equipment Cost

- Additional hardware + towers, wire and cables, power supplies, and high-speed data line.
- Site access/rental fees

### Additional Implementation Time Needed

- Plan and test line-of-site paths
- Determine hardware needs
- Construct sites and Install hardware
- Training to operate

### Faster Equipment Obsolescence

- Changing band-width restrictions.
- "Domino" effect of equipment change  
Radio → modem → battery → solar panel → wires

### Increased Vandalism

- RT hardware suitable for many CB and 12V applications
- Inviting targets

### Site Control Issues

- Remote sites often required repeater stations
- Site access can change over time

## 5.0 Recommendations

### Value of RT Increases with Study Complexity

Factors = no. stations/sensors, study time length, distance to field sites, data value, personnel costs

As Factors increase, RT value increases

### Be Very Careful of Site Control Issues

Loss of station = troublesome, loss of repeater = panic!

Access importance increases with study time length

### Buy from Suppliers with Strong Technical Support

Why? Do-it-yourselfers need (a lot of) help

Worth the extra cost

Get advice for colleagues

Develop personal relationship with tech. support person

### Regular Field Visits Will Still be Necessary

Sensors and equipment require regular maintenance

Field sites change

### Document All Designs, Specifications, & Procedures

Ad-hoc expertise is quickly forgotten